EM The Urban Environment

Preview of A&WMA's Third Urban Forum:

EPA Program Focuses on Integrated Strategies for Air Pollution and GHG Mitigation

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The deterioration of air quality associated with rapid global urbanization is the focus of the Third International Urban Air Quality Forum, which will be held during A&WMA's 2001 Annual Conference & Exhibition in Orlando, FL. This article highlights EPA's Integrated Environmental Strategies program, one of the programs featured at this year's Forum.

Technical experts, policy-makers, and decision-makers from around the world will gather this June at the "Third International Urban Infrastructure Forum," which will be held in conjunction with A&WMA's Annual Conference & Exhibition in Orlando, FL, June 24–28, 2001, to focus on air quality and environmental stewardship in the world's megacities. The Forum will feature a highly interactive format and focus on past and current air quality improvement programs worldwide. Open discussions will emphasize interaction and networking between experts with hands-on urban air quality management experience and will allow participants to gain insights into the air pollution control approaches that best meet their needs.

Many of the Forum participants have long struggled with the problem of deteriorating urban air quality associated with rapid urbanization throughout the world. More recently, another major global concern has emerged that, at first glance, appears to be a separate challenge: global warming. Global warming results from emissions of carbon dioxide (CO_2) and other greenhouse gases (GHGs) on a worldwide scale with potential long-term environmental impacts, while urban air quality problems concern the immediate impacts of more traditional air pollutants caused by industrialization and urbanization. Many countries are struggling to balance economic development and long-term environmental risk minimization (i.e., global change), along with critical day-to-day needs (i.e., air quality and human health improvement). There is growing recognition around the world that these problems overlap significantly and offer opportunities for development and implementation of strategies and measures that address multiple environmental problems. Similarly, there is an emerging understanding that effective integration of climate change and local environmental strategies will help ensure the wise use of limited resources by harmonizing efforts to reduce GHG emissions with other national and local environmental protection programs.

A number of regional, national, and international organizations are working to improve understanding of multiple benefits strategies. In March 2000, the Intergovernmental Panel on Climate Change (IPCC) held a workshop in Washington, DC, in conjunction with the Organization for Economic Cooperation and Development (OECD), the U.S. Environmental Protection Agency (EPA), and several other governmental and nongovernmental organizations, to consider the current state of knowledge and research needs regarding the ancillary benefits and costs of GHG mitigation (results of this meeting are summarized in Davis et al.[1]). One focus of this meeting was local air pollution and

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public health benefits of strategies that simultaneously reduce GHG emissions and local air pollution precursors. Many other organizations are analyzing the linkages between localized and global air quality issues, including the World Bank Clean Air Initiative Program and the State and Territorial Air Pollution Program Administrators and Association of Local Air Pollution Control Officials (STAPPA/ALAPCO).[2]

EPA's Integrated Environmental Strategies (IES) program[3] addresses these opportunities for multiple benefit strategies working with experts in a number of developing countries and will be one of many programs highlighted during this year's Urban Forum.

INTEGRATED ENVIRONMENTAL STRATEGIES

The IES program is based, in part, on analytical methodologies developed and applied in the United States during the 1990s to evaluate health and environmental benefits of various clean air policies. Through the IES program, EPA and its U.S. technical support team provide technical and financial assistance to experts around the world to establish interdisciplinary and multi-institution teams and adapt existing tools and methods to specific needs and situations in those locations. Such methods include developing baseline and policy scenarios; estimating air pollutant and GHG emissions; modeling air pollution concentrations; estimating human exposures and health effects changes due to policy scenarios; estimating the economic valuation of the physical health effects; and analyzing the policy implications of the studies.

The IES program is currently working in partnership with experts in Argentina, Brazil, Chile, China, Korea, and Mexico to evaluate the public health and environmental benefits of integrated strategies for GHG mitigation and air pollution control (new partnerships are also being established in South Africa and India). The main objectives of the IES Program are to

- support and promote analysis and quantification of the environmental, public health, and economic benefits of integrated air pollution and GHG reduction strategies and measures for the energy and transport sectors in developing countries;
- develop, test, and refine effective analytical methodologies to guide further collaboration on multiple benefits analysis;
- assist policy-makers in developing countries with the development of integrated strategies for addressing local air pollution and global climate change; and
- develop or enhance lasting institutional capacity for analysis of health, environmental, and GHG mitigation impacts of alternative strategies and integrated air pollution and climate change policies.

Results from Chile and Korea

Teams in Chile and Korea have completed initial climate change and air pollution assessments, which analyze potential benefits from simultaneous controls of GHG emissions and air pollutants (co-controls). China has completed partial analysis, and Argentina, Brazil, and Mexico are at various stages of their studies, but as yet have not produced quantitative results. Results from Chile and Korea, as shown in Table 1, indicate that GHG mitigation measures under consideration in these countries would significantly reduce local air pollution and result in considerable public health and economic benefits.

Table 1 presents the "co-benefit" results of modest GHG reduction measures from readily available scenarios for the energy sector. These scenarios are neither comprehensive, nor comparable across the countries, but both studies found that significant health benefits could be associated with the implementation of low or no-cost mitigation measures. The policy

Table 1. Summary of results for 2010 and 2020 for Chile and Korea.

	Chile		Korea	
Study Region	Santiago Metro Region: Extended to whole country		Seoul Metro Region	
Energy Measures in Climate Policy Scenario	– Energy efficiency – Fuel switching – Transportation – Incorporation of assumptions from the Santiago decontamination plan and national strategic plan		– Energy efficiency – CNG buses	
Air Pollutants Evaluated	$PM_{2.5}$		PM_{10}	
	2010	2020	2010	2020
Carbon Reductions in Million Tons of Carbon Equivalents (eq)	1.4	3.9	2.25–6.75	2.82–8.46
Annual Avoided Deaths	100	305	33-98	40-120
Annual Avoided Respiratory Diseases	133,000	399,000	2257-6772	2787-8361
Economic Annual Value of Health Effects	$60–472 million (1997 $)[a]	$240–1892 million (1997 $)[a]	$48–145 million (1999 $)	$59–179 million (1999 $)
Economic Benefits/Ton of Carbon (eq) Reduced	$42–337 (1997 $)	$60–479 (1997 $)	$10–38 Ave. $21 (1999 $)	$10–38 Ave. $21 (1999 $)

[a] Benefits estimated using only source apportionment air quality model.

scenario for Chile estimated an avoidance of approximately 300 deaths per year and 400,000 cases of respiratory disease. Using estimates that reflect the willingness to pay of individuals to reduce the occurrence of one additional effect, the estimated economic value of these avoided health effects is $240–1892 million U.S. dollars per year by 2020. For Korea, a smaller scale scenario estimated an avoidance of 40–120 deaths per year and 2800–8400 cases of respiratory disease, with an estimated economic value of $59–179 million per year by 2020.

These results indicate that the air pollution health benefits of fairly modest GHG reduction measures are highly significant. When the economic benefits per ton of CO_2 emissions reduced are calculated for Chile and Korea, the benefits range from $10 to $479/ton of carbon reduced. On the basis of the air pollution health benefits for particulates alone, therefore, the analysis indicates that these countries can capture highly significant air pollution and GHG reduction co-benefits by implementing even fairly modest measures.

Climate change and air pollution officials from the participating countries have been actively engaged in all phases of the analyses to ensure that integrated policies will be considered in the development of their climate change and air pollution programs. The preliminary results for Chile, China, and Korea were discussed and evaluated by climate and air pollution officials through organized workshops. The following list highlights key outcomes of the workshops:

- Climate change officials noted that analysis of the ancillary air pollution and public health benefits of GHG mitigation is of great value in terms of improving understanding and awareness of the local development and economic benefits of energy sector GHG mitigation measures. They further noted that this kind of study could show where resources and policies should be directed to successfully capture co-benefits.
- The officials noted that the preliminary findings, indicating highly significant public health and air pollution benefits, could be valuable in building stakeholder support for action to reduce GHG emissions.
- Finally, both the climate and air pollution officials indicated a strong interest in using these results and future analyses to help them evaluate and develop harmonized policies at the national and local levels for addressing local air pollution and climate change.

EPA intends to continue working with the initial set of countries to improve quality and completeness of analyses for all participating countries, and to encourage the development of long-term projects in these countries. In addition, the IES program aims to continue to expand the network of participating organizations and to increase collaboration with a wide range of international donor organizations and leading technical institutions; increase emphasis on methods and tools for identifying and screening integrated strategies to capture multiple benefits and enhance efficiency of environmental strategies; and expand the scope of the analysis of integrated strategies. A priority for the near-term is to incorporate methods for quantifying a range of local economic benefits of clean technology strategies, which include increased economic efficiency, reduced fossil fuel costs, increased small business development and employment opportunities, and reduced foreign exchange requirements for the local economies.

URBAN FORUM

EPA is organizing a technical session at this year's Urban Forum to present results and stimulate discussion of a range of multiple benefits strategy programs. A major objective of the technical session is to stimulate discussion and solicit advice on results to date and possible future directions for EPA's IES program, as well as for similar programs being implemented by other sponsors. Forum participants will have the opportunity to learn about IES work, including presentations from some of the key developing country experts, and to comment on future directions for multiple benefits strategy programs in general.

For more information on EPA's IES program, go to *www.nrel.gov/icap*, or contact Paul Schwengels, program manager, EPA's Office of Atmospheric Programs, at phone: (202) 564-3487; fax: (202) 565-2155; or e-mail: *schwengels.paul@epa.gov*; or Collin Green, project leader, National Renewable Energy Laboratory (NREL)—EPA's primary technical support institution for this program—at phone: (202) 646-5034; fax: (202) 646-7780; or e-mail: *collin_green@nrel.gov.*

REFERENCES

1. Davis, D.L.; Krupnick, A.; McGlynn, G. *Ancillary Benefits and Costs of Greenhouse Gas Mitigation: An Overview*; Organisation for Economic Co-operation and Development (OECD): Paris, France, 2000; available on the OECD Web site, *http://www.oecd.org/env/docs/cc/abworkshop-overview.pdf* (accessed March 2001).
2. See, for example, *Reducing Greenhouse Gases & Air Pollution: A Menu of Harmonized Options, Executive Summary and Case Studies*; State and Territorial Air Pollution Program Administrators and Association of Local Air Pollution Control Officials (STAPPA/ALAPCO): Washington, DC, 1999; available on the STAPPA/ALAPCO Web site, *http://www.4cleanair.org/comments/execsum.PDF* (accessed March 2001).
3. Detailed information on the IES program (formally referred to as the International Co-control Benefits Analysis Program, or ICAP) is available on the Web site maintained by the National Renewable Energy Laboratory, *http://www.nrel.gov/icap/* (accessed March 2001).

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